Epidemiological and morbidity pattern of respiratory diseases in children admitted in the paediatric ward of a tertiary hospital in Southern Nigeria

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Abstract

Context: Respiratory tract diseases contribute a majority of paediatric admissions and are a major cause of death in children less than five years.

Objective: To assess the epidemiological and morbidity patterns of respiratory disease in children admitted in the paediatric ward of a tertiary hospital in Southern Nigeria

Methods: A retrospective cross-sectional study. Information on all patients admitted into the paediatric medical ward with a respiratory diagnosis from January 2013 to December 2017 were extracted from the ward register. Data were analysed using Stata version 15.1.

Results: The prevalence of respiratory diseases was 39.9% (1307 out of 3276). Five hundred and seventy-four (43.92%) of the 1307 children with respiratory disease belonged to the 12-59 months age group. Respiratory diseases were commoner in males (61.29%) with a male to female ratio of 1.6: 1, (p=0.86). The three commonest childhood respiratory diseases were pneumonia (46.09%), acute pharyngitis (26.8%) and bronchial asthma (11.41%). The median duration of admission for all children with respiratory diseases was five days with a discharge rate of 96.9%. Thirty-five children with respiratory diseases had complications. The commonest complication observed was congestive cardiac failure in 23 out of 35 (65.71%). Analysis of the monthly trend showed a double peak for pneumonia in March and October with acute pharyngitis following a similar peak.

Conclusion: Infectious respiratory diseases are still the commonest respiratory diseases in Nigerian children but bronchial asthma is also on the rise. We therefore recommend a scaling up of programs for the prevention and treatment of childhood respiratory diseases.

Keywords: Respiratory, Diseases, Paediatrics, admissions.

Introduction

Acute respiratory tract infections (ARI) contribute a majority of paediatric admissions and are a major cause of death in children less than five years.[1] In Nigeria, overall care-seeking for children with respiratory infections is in about 60% of cases. Only 38% of this children are taken to appropriate (private and public providers who have undergone formal training and facilities that have received accreditation and are therefore authorized to treat children with signs of ARI) care providers.[2] Some factors associated with the care-seeking behaviour in Nigeria include; age of the child, family wealth, great use of home care, drug vendors and private clinics due to financial constraints, wishing to try home management first, and poor recognition of the

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severity of the illness or waiting for the child to improve.[3,4,5]

A study from the Netherlands has shown that respiratory symptoms account for 25% of consultations for children in general practice.[6] Studies around the world including Nigeria have shown respiratory diseases to be among the top three reasons for admissions in the Paediatric unit.[7,8,9] Most studies observed a male preponderance and the mortality was quite low and usually resulted from severe bronchopneumonia.[2,9] Some Nigerian studies have observed a seasonal variation in acute respiratory infections in Nigerian children with episodes occurring during the rainy season.[10,11] However, another study has shown a biannual peak in childhood admissions that correspond with the dry harmattan season and wet rainy season.[9] The morbidity from childhood respiratory diseases is generally low, with short durations of stay in hospital, there is however a variation in the mortality rate which is dependent on the severity of the illness and time of presentation in the hospital.[12,13,14] The common complications of respiratory disease in children include congestive heart failure and pleural effusion amongst others. These complications are usually associated with bronchopneumonia and bronchiolitis.[15] However, a study has shown a significant correlation between early-onset respiratory infections and a high risk of anxiety disorders in later life [16]. It is therefore pertinent to study the epidemiological pattern of respiratory diseases seen in our environment considering the increasing number of mental health disorders in our society.

There is a paucity of study of childhood respiratory diseases in south-south Nigeria in general and in Uyo in particular. We, hope that an understanding of epidemiological trends in the childhood respiratory admissions will assist in health care planning and appropriate resource allocation. Also, information on the burden of disease in the community will assist in the design of proper priority settings and intervention planning.

We present a five year retrospective study of the pattern and outcome of admissions into the paediatric medical ward of UUTH for all respiratory paediatric diseases from January 2013 to December 2017. The Neonatal wards, the Children Emergency unit, the children outpatient unit and the Paediatric Surgical Ward were excluded from the study.

Materials and methods

This was a retrospective cross-sectional study. Information on all patients admitted into the paediatric medical ward with a respiratory diagnosis were extracted from the ward register. These included the age and gender of the patients, the diagnosis, month and year of admission, duration of treatment, complications and outcome of treatment. Data were analysed using Stata version 15.1. Descriptive statistics (mean and standard deviation) were calculated for continuous variables. Categorical variables were presented as frequency and percentages. Chi-square test or Fisher's exact test was used to test for association between categorical variables. Mann-Whitney U test was used for non-parametric data while a Cochran-Armitage trend test was used to assess for trends across periods A p-value of <0.05 was taken as statistically significant.

Ethical clearance for the conduct of the study was obtained from the Ethics committee, UUTH, Uyo. The addresses, names, hospital number and other identifiers of the patients were omitted to maintain confidentiality.

Results

The total inpatients for all paediatric conditions from January 2013 to December 2017 were 3276, while the total number of respiratory cases for this period was 1307. This gave a prevalence of 39.9% for respiratory diseases.

Five hundred and seventy-four (43.92%) of the 1307 children with respiratory disease belonged to the 12-59 months age group, closely followed by 500 children (38.26%) in the 0-11months age group. There was no statistical difference between the age group (p=0.43). Respiratory diseases were commoner in males (61.29%) with a male to female ratio of 1.6: 1, but there was no significant difference (p=0.86).

Most children (96.9%) of children with respiratory diseases were discharged. There was a low mortality rate of 0.69% (95% CI 0.32-1.31) among children with respiratory diseases. Children who died from respiratory diseases were younger than the survivors (19.7 months versus 30.8 months), but it was not statistically significant. (Table I)

Pneumonia was the commonest childhood

Table I: Age, gender distribution and outcome of children with respiratory diseases

Age (months)	Gender		
	Female (%)	Male (%)	Total
0-11	201 (39.72)	299 (37.25)	500 (38.26)
12-59	219 (43.28)	315 (44.38)	574 (43.92)
60-143	57 (11.26)	110 (13.75)	167 (12.78)
=144	29 (5.73)	37 (4.63)	66 (5.05)
Total	506 (38.71)	801 (61.29)	1307 (100)

Outcome	Number (n=1296)	Frequency
Discharged	1256	96.91%
Absconded	3	0.23%
Left against medical advice	22	1.70%
Dead	9	0.69%
Transferred out	6	0.47%

Table II: Spectrum of paediatric respiratory diseases

Disease (n=1280)	Frequency			Percentage (%)		
	M	F	T	M	F	T
Pneumonia	341	249	590	43.38	50.40	46.09
Acute Pharyngitis	220	126	346	27.99	25.51	26.80
Bronchial Asthma	101	45	146	12.85	9.11	11.41
Bronchiolitis	44	22	66	5.60	4.45	5.16
Pulmonary Tuberculosis	28	16	44	3.56	3.24	3.44
Otitis media	16	11	27	2.23	2.04	2.11
Nasopharyngitis	12	14	26	1.53	2.83	2.03
Adenoidal hypertrophy	9	3	12	1.15	0.61	0.94
Pneumonitis	5	2	7	0.64	0.40	0.55
Acute chest syndrome	3	1	4	0.38	0.20	0.31
Pertussis	2	2	4	0.25	0.40	0.31
Atypical pneumonia	0	2	2	0.00	0.40	0.16
Bronchitis	2	0	2	0.25	0.00	0.16
*Others	2	1	3	0.26	0.20	0.24
Total	786	494	1280	100	100	100

*foreign body in the airway, laryngomalacia and pneumocystis pneumonia. M=Male; F=Female; T=total

Table III: Duration of admission in relation to age and some common respiratory diseases

Age group (months)	Frequency (n=754)	Median (days)	Interquartile range
0-11	268	5	3 - 8
12-59	345	4	2 - 7
60-143	103	4	2 - 6
=144	38	3	2 - 6
Disease	**Frequency (n=753)**	**Median(days)**	**Interquartile range**
Pneumonia	333	5	3 - 8
Acute pharyngitis	212	4	3 - 6
Bronchial Asthma	87	2	1 - 3
Pulmonary Tuberculosis	34	6	3 - 8
Bronchiolitis	32	4	3 - 6
Otitis Media	21	9	7 - 10
Nasopharyngitis	13	3	2 - 6
Adenoid Hypertrophy	8	4.5	2 – 5
Others	12	5.1	4.7 - 6

Table IV: Complications and Comorbidities associated with respiratory diseases

Complication	Frequency (n=35)	Percentage (%)	Respiratory Disease (n)
Congestive Cardiac failure	23	65.71	Pneumonia(21) Bronchiolitis (2)
Failure to Thrive	3	8.57	Pneumonia (3)
Pleural effusion	2	5.71	Pneumonia (2)
Pericardial effusion	1	2.86	Pulmonary Tuberculosis
Dehydration	3	8.57	Acute pharyngitis (2) Bronchiolitis (1)
Prostration	1	2.86	Pneumonia (1)
Simple febrile convulsion	1`	2.86	Acute pharyngitis (1)
Sepsis	1	2.86	Acute pharyngitis (1)
Co – morbidities (n=427)*			
Disease	Number (n)		Percentage (%)
Malaria	165		38.64
Sepsis	48		11.24
Congenital heart disease	34		7.96
HIV/AIDS	26		6.09
Gastroenteritis	23		5.39
Malnutrition	21		4.92
Sickle cell Anaemia	16		3.74
Measles	13		3.04
Trisomy 21	11		2.58
Impertigo	6		1.41
Others**	64		14.99

*Some children had more than one co- morbidity ** Others include; Hypertrophic adenoids, cerebral palsy, seizure disorders, airway foreign body
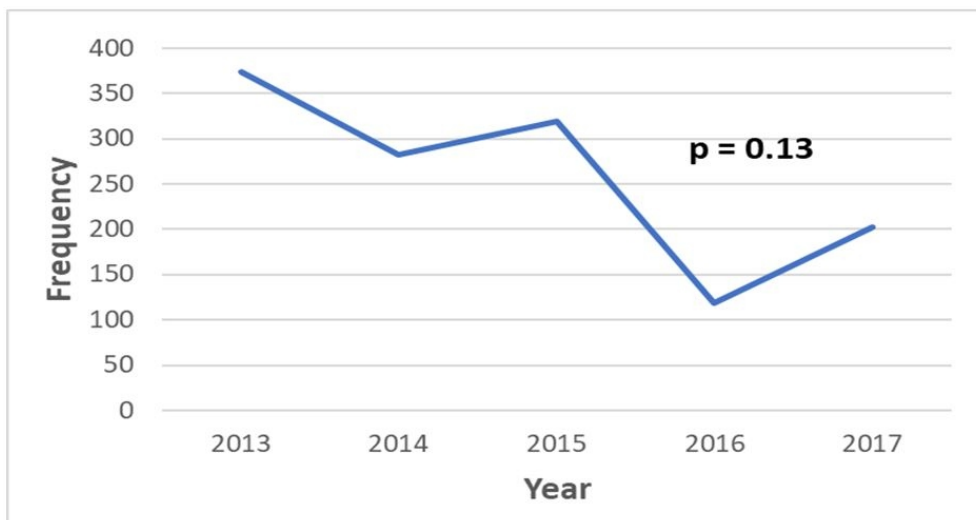
Figure 1: Yearly trend of respiratory diseases of children admitted in the paediatric ward of UUTH
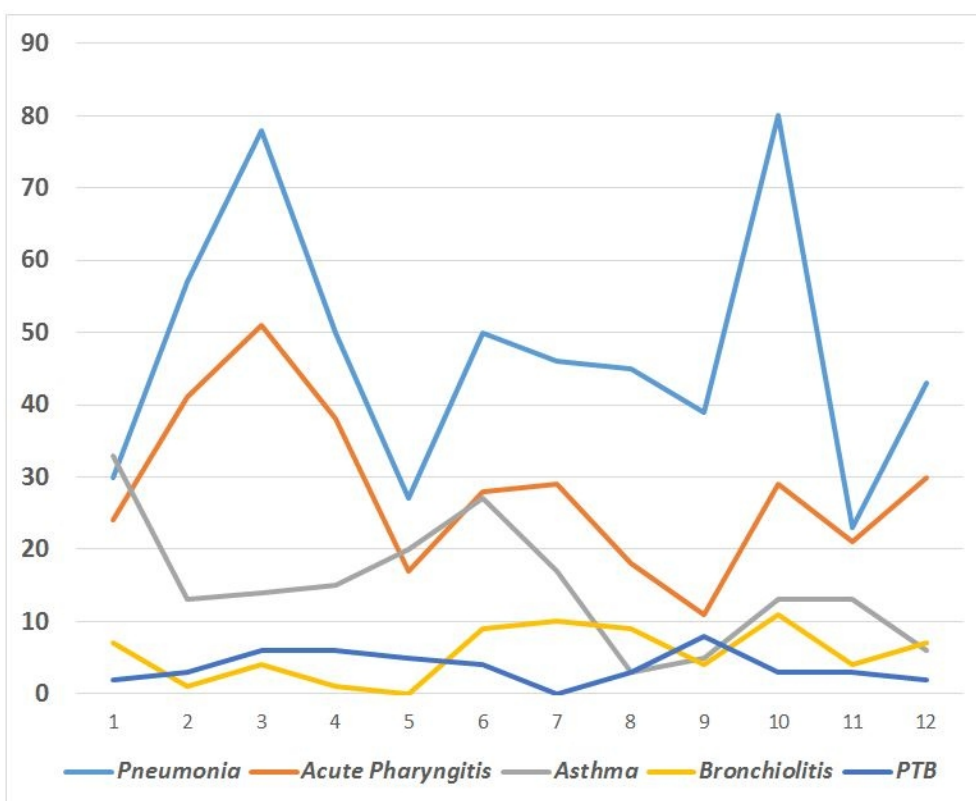

Figure 2: Monthly trend for the five commonest childhood respiratory diseases in UUTH

respiratory disease in both gender, occurring in 590 (46.09%) children. (Table II)

The median duration of admission for all children with respiratory diseases was five days (interquartile range: 1-32). Children 0-11 months had the most prolonged duration of stay. Bonferroni test showed a significant difference between groups p=0.0000.

Children diagnosed with otitis media, stayed longest on admission nine days, and this was followed by pulmonary tuberculosis with a duration of stay of six days and pneumonia with a duration of admission of five days. (Table III)

Thirty-five children with respiratory diseases had complications. The commonest complication observed was congestive cardiac failure in 23 out of

35 (65.71%). Of the 23 children with congestive cardiac failure 21 presented with pneumonia, while two presented with bronchiolitis. Children with pneumonia had the most frequent number of complications, 25 out of 35 (71.4%). The proportion of children with pneumonia who had complications were 25 out of 590 (4.2%). Four hundred and twenty seven children with respiratory diseases had co-morbidities. The five most common co-morbidities were Malaria (38.64%), Sepsis (11.24%) and congenital heart disease (7.9%), HIV/ AIDS (6.09%) and Gastroenteritis (5.39%). (Table IV) There was a tendency to reduction in the frequency of respiratory admissions between 2013 and 2017 but this reduction did not achieve statistical significance, as shown in the yearly trend graph. (Figure 1). Analysis of the monthly trend of the five principal respiratory diagnosis – pneumonia, acute pharyngitis, bronchiolitis, tuberculosis and bronchial asthma, showed a double peak for pneumonia in March and September/ October. Acute pharyngitis also followed a similar peak to pneumonia, but the peak in October was less pronounced. bronchial asthma showed a peak in June, with a drop in august and another rise with a plateau in October and November. Bronchiolitis started rising in May and plateaued from June to August with a slight peak in October. However, admissions for Tuberculosis was constant throughout the year. (Figure 2)

Discussion

Our study has shown a prevalence rate of 39.9% for childhood respiratory diseases in ward admissions of which pneumonia was the commonest diagnosis. This is higher than the value from other parts of southern Nigeria which range from 16.1%-22.1%.[9,14] This higher prevalence could be explained by the differences in the locations of the study (ward versus the emergency room.[9,14] Our location in the mangrove rain forest with prolonged rainy season and increased susceptibility to both viral and bacterial pathogens during the rainy season could account for this. The three commonest respiratory diseases in our study were pneumonia, acute pharyngitis and bronchial asthma. Pneumonia as the commonest cause of respiratory illnesses in our study is in keeping with other studies from south-south Nigeria.[14,17] The high prevalence of bronchial

asthma (11.41%) in our study compared to previous studies, is in keeping with the rising trend of asthma in previous studies.[18,19] This is a likely pointer that apart from infectious diseases, non-communicable respiratory diseases are beginning to be a problem in Nigeria. Also, the differences in prevalence could be explained by the burden of undiagnosed asthma in various communities and the different sample sizes in the different studies. Furthermore, this finding is possibly a result of westernised lifestyle changes, industrialisation, indoor and outdoor air pollution from biomass fuels and gas flaring increased awareness and diagnosis of bronchial asthma and the higher prevalence of severe asthma in less developed countries.[20,21] Respiratory diseases were commonest in the 12-59 months age range and this could be attributed to the fact that most children in 0-11months were still being breastfed and breast milk has been shown to have protective effects against respiratory diseases.[22] The higher prevalence of respiratory diseases in males seen in our study has also been observed in other studies.[1,13] Theories explaining the higher prevalence in males include gender bias in parental health-seeking behaviour, with better health-seeking behaviour for boys or there may be an epidemiological reason for male susceptibility to infection.[2,3,13] Children with respiratory diseases had a short median duration of stay on admission. This may not be unconnected to the fact that most respiratory diseases seen in our series were preventable and treatable illnesses and except they present late or become complicated most children recover early and are discharged. A longer duration of admission has been associated with younger age group, severity of illness, type of illness, complications and chronicity of disease.[13,15] These factors were also seen in our study as children < 11months, children with otitis media, tuberculosis and complicated pneumonia, stayed the longest on admission. Our study showed that congestive cardiac failure mostly secondary to pneumonia was the commonest complication, and this is in keeping with a previous study.[15] This was closely followed by failure to thrive and dehydration which may have been a result of the inability to feed and increased insensible loss usually associated with the increased work of breathing in severe pneumonia. Our study showed a low mortality rate for respiratory diseases which is in keeping with a previous study.[9] Children

who died in our study were younger than those who lived (19.7 months vs 30 months), but it was not statistically significant, and this was possibly because the majority (82.18%) of children with respiratory disease were under- five years of age. An interplay of poor environmental and low socioeconomic conditions and late presentation which leads to the persistence of infections causing prolonged morbidity and death may have contributed to the mortality in our study as also reported from a previous study.[9]

Observation of the monthly trend for the top five respiratory illnesses showed biannual peaks for pneumonia and acute pharyngitis which corresponded to the dry harmattan and rainy season. Bronchial asthma admissions were high in January and June (Hot dry dusty season and onset of the rainy season). Bronchiolitis admission had a peak in October (Rainy season), while admissions for Tuberculosis was stable all year round. The seasonal variation seen for particular types of respiratory illness is likely a result of the transmission pattern for the organisms causing the infectious diseases and the peak of the environmental trigger factors for acute asthma exacerbations.[23] This seasonal trends in childhood admissions have been observed by previous Nigerian studies.[9-11] Our study showed similar seasonal admissions peaks for Acute pharyngitis and Pneumonia, and this may be a confirmation that most cases of pneumonia result from descending airway infection.

Conclusion
Our study has shown a high prevalence of childhood respiratory diseases. pneumonia, acute pharyngitis and bronchial asthma account for most of the childhood respiratory admissions in UUTH. This indicates that apart from infectious diseases, non-communicable respiratory diseases are now on the rise in Nigerian children. The prognosis is good for childhood respiratory diseases with most mortality occurring in children less than two years. Seasonal variations have been observed for both upper and lower respiratory infections. We therefore recommend that there should be a scaling up of programs for the prevention and treatment of childhood respiratory diseases. This will include community awareness, training of health workers on the early recognition of symptoms of childhood

respiratory diseases especially pneumonia and the appropriate treatment of childhood respiratory diseases.

Limitations
Our significant limitations were as a result of missing data due to poor record-keeping. In addition, to our inability to ascertain other socioeconomic and environmental factors that may have contributed to the increased prevalence of childhood respiratory diseases in UUTH.

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